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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/590,234

08/22/2006

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EXAMINER

KURTZ, BENJAMIN M

ART UNIT

PAPER NUMBER

1797

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/590,234	<b>Applicant(s)</b> AIZAWA, MASANOBU	
	<b>Examiner</b> BENJAMIN KURTZ	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/06, 5/08</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

Claims 1-14 are pending.

### ***Claim Rejections - 35 USC § 102 and 103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**1. Claims 1, 4, 6, 9, 10, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Goldsmith et al. US 5 221 484.**

Claim 1, Goldsmith teaches a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in

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that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (col. 6, lines 60-66, col. 7, lines 4-36, col. 8, lines 7-13).

Claims 4, 6, 9, 10, 13 and 14, Goldsmith further teaches the mean pore diameter of the base layer is about 5 microns or greater, and the mean pore diameter of the foundation layer is 0.1-5 microns (col. 7, lines 4-36); the thickness of the foundation layer is less than 100 microns (col. 7, lines 24-36); the porosity of the substrate is 40% or greater (col. 7, lines 14-18); and the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Goldsmith does not mention any Ca or K being present anywhere in the disclosure.

**2. Claims 1, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshikawa et al. US 6 503 294.**

Claim 1, Yoshikawa teaches a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (col. 5, line 24 – col. 6, line 27, col. 6, lines 46-51).

Claims 13 and 14, Yoshikawa further teaches the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Yoshikawa does not mention any Ca or K being present anywhere in the disclosure.

**3. Claims 1, 5, 6, 9 and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Verduijn et al. US 6 090 289.**

Claim 1, Verduijn Yoshikawa teaches a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (col. 4, lines 47-64, col. 5, lines 1-47).

Claims 5, 6, 9, 13 and 14, Verduijn further teaches the thickness of the base layer is 3mm (col. 16, lines 24-30); the thickness of the foundation layer is in the range of 0.1-150 microns (col. 5, lines 1-12); the porosity of the substrate is 33% (col. 16, lines 24-30); and the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Verduijn does not mention any Ca or K being present anywhere in the disclosure.

Claim 11 and 12, Verduijn teaches the porous substrate has a pore size in the range of 0.08-0.16 microns with a narrow pore size distribution (col. 5, lines 30-35).

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Therefore the maximum pore diameter would not be more than 7 microns. How the maximum pore diameter is determined is a process limitation that does not further structurally limit the membrane.

**4. Claims 1, 6, 9, 10, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Lai et al. US 5 871 650.**

Claim 1, Lai teaches a separation membrane comprising: a porous substrate which is made of ceramic sintered body of which a main ingredient is alumina, and a zeolite membrane which is formed over the surface of the porous substrate, wherein the porous substrate comprises a base layer and a foundation layer which is formed on the base layer and, wherein the separation membrane is characterized in that a mean pore diameter of the foundation layer is smaller than a mean pore diameter of the base layer (col. 4, line 50-55, col. 5, line 45 – col. 6, line 5).

Claims 6, 9, 10, 13 and 14, Lai further teaches the thickness of the foundation layer is 0.1-20 microns (col. 6, lines 35-40); the porosity of the substrate is in the range of 20-50% (col. 6, line 1); and the total content of Ca and K included in the porous substrate is not more than 0.5 mol%, Lai does not mention any Ca or K being present anywhere in the disclosure.

**5. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai '650 and Verduijn '289 and Goldsmith '484.**

Claims 4-6, Lai teaches the separation membrane of claim 1 but does not teach the claimed permeation rates. Lai does teach the claimed thickness of the foundation layer and that the substrate pore size and thickness should be chosen such that the mass transfer resistance does not limit the flux of material permeating through the membrane (col. 5, lines 60-66). One skilled in the art would be led by the teachings of Lai to adjust the pore size and thickness of the base layer and foundation layer to achieve a suitable flux of material through the membrane. The claimed dimensions are known in the prior art. Verduijn teaches the claimed thickness of the base layer as detailed in the rejection above and Goldsmith teaches the claimed pore diameters of the base layer and the foundation layer as detailed in the rejection above. The claims would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations, KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385 (2007).

Regarding claim 2 and 3, all of the claimed dimensions and materials are known in the art and in combination, as detailed above, would inherently have the claimed permeation rate through the porous substrate.

**6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lai '650 and Moyer et al. US 5 198 007.**

Lai teaches the separation membrane of claim 1 but does not teach the claimed aspect ratio of the particles used to form the foundation layer. Moyer teaches a sintered ceramic media of alumina made of particles. Moyer teaches the aspect ratio of the particles determines the pore size of the filter. The claimed aspect ratios would have been obvious because the design incentives, to manipulate the pore sizes to obtain a suitable porous product, provided a reason to make an adaptation, and the invention resulted from application of prior knowledge in a predictable manner, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN KURTZ whose telephone number is (571)272-8211. The examiner can normally be reached on Monday through Friday 8:00am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Benjamin Kurtz  
Examiner  
Art Unit 1797

/Benjamin Kurtz/  
Examiner, Art Unit 1797  
12/17/08

/Krishnan S Menon/

Primary Examiner, Art Unit 1797